DECLARATION OF DOCTOR INGRID MCBRIDE

Ingrid McBride, under penalty of perjury, deposes and states as follows:

My name is Ingrid McBride. I am the Director of Audiology for the Department of Speech and Hearing Science of Arizona State University. Among my other professional activities, since 2001 I have been an audiology consultant, offering consulting services to the Arizona Department of Economic Security/Vocational Rehabilitation ("ADESVR") and Arizona Health Care Cost Containment System.

I hold the degree of Doctor of Audiology from the University of Florida. I also hold the degrees of Master of Audiology from Arizona State University and a bachelor of science in speech and hearing science from Arizona State University. My curriculum vitae, setting out my full qualifications, is attached to this declaration.

I understand the Federal Communications Commission is concerned to ensure that Captioned Telephone Relay Service ("CTS") is provided only to persons actually needing the service to use the telephone system in a manner functionally equivalent to hearing persons. I further understand, the FCC is anticipating requiring the provision of a certification from a hearing professional to substantiate the need of the individual to use CTS. I am not affiliated with any CTS provider; nor have I been promised or paid any consideration for the making of this Declaration.

I have been asked to discuss what amount of hearing loss would necessitate the use of captioned telephone relay service for a person with hearing loss to be able to use the telephone system in a manner functionally equivalent to hearing persons. As a corollary to that question I have been asked to evaluate the extent to which hearing aids or amplified telephones would obviate the need for the individual to use CTS, and to suggest an appropriate standard for hearing professionals to apply in providing the contemplated certification.

As discussed below, a standard for certification of CTS users should be based on the following elements: (1) hearing loss in the better ear in excess of 40 dB HL, or (2) sufficient impairment in speech discrimination without visual cues which results in a not insubstantial impairment of an individual's social or business life in the absence of use of CTS. While the first element of the test is plainly objective, the second has a subjective element requiring analysis by the hearing professional.

Hearing impairment may be defined to include a reduction in hearing acuity or sensitivity, or the presence of tinnitus. It relates primarily to the inability of the affected individual to hear sounds at certain levels. This is tested by presenting pure tones at frequencies of 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 6 kHz and 8 kHz and is shown in steps of 5 dB HL (Decibel Hearing Level) on a chart known as an audiogram. The threshold of hearing is defined as 0 dB HL on the basis of testing a number of young people who are assumed to not have suffered hearing loss. It is generally accepted that hearing thresholds lying between 0 dB HL and 20 dB HL across the frequency range tested may be deemed within "normal" limits. Averaging hearing loss over the frequency range yields a convenient single figure for hearing loss in each respective ear.

There are two types of hearing impairment, defined according to where the problem occurs: conductive hearing impairment and sensorineural hearing impairment. There can and often is a combination of the two types of hearing loss. Conductive hearing impairment is a problem in the outer or middle ear. This type of hearing problem is often medically or surgically treatable; childhood middle ear infection is the most common example. Sensorineural hearing impairment is usually due to a problem with the inner ear, and occasionally with the auditory nerve going from there to the brain. This type of hearing problem is usually permanent and requires rehabilitation. Common causes are ageing, excessive noise, ototoxic drugs, etc.

The principal factor in the ability to use the telephone is the ability to discriminate and understand speech without visual cues (such as lip reading, facial expression, sign language or other gestures). In other words, speech discrimination is a measure of how well an individual understands what he or she hears when speech is loud enough to hear comfortably.

Audiologists measure speech discrimination as a percentage. A discrimination score of 100 percent means an individual understands everything he hears. At the other end of the spectrum, 0 percent discrimination means an individual cannot understand a single word that is spoken, no matter how loud it is.

The ability of an individual to discriminate speech is not perfectly predicted by the pure-tone audiogram. An individual may hear a sound well enough, but the neural signals may be altered to the extent that the sound is unintelligible. Individuals suffering only a conductive hearing loss generally will be able to identify words if the sound is loud enough. For these persons, hearing aids and/or amplified telephones alone may allow them to use the telephone system in a functionally equivalent manner.

For persons with sensorineural hearing loss, however, there is a marked drop in the score without a proportionate loss of pure-tone or speech sensitivity. That is, although the speech signal may be loud enough it is not clear enough to understand due to distortion caused by the cochlear or neural damage. This difficulty is exacerbated in the presence of background noise. Likewise, while persons with serious hearing loss who have undergone cochlear implants (CI) may exhibit substantially improved pure tone responses, the overwhelming number of them will continue to suffer substantial speech discrimination deficit. This is owing to the inherent limitations of the CI compared to the healthy human ear.

The inner ear structures include the cochlea and the auditory nerve. The cochlea is filled with a water-like fluid. The cochlea is a snail-shaped organ that would stretch to approximately 3 cm. In addition to being filled with fluid, the inner surface of the cochlea is lined with some

20,000 hair-like nerve cells that perform one of the more critical roles in our ability to hear. These hair cells differ in length by minuscule amounts; they also have different degrees of resiliency to the fluid that passes over them. As a compressional wave moves from the interface between the ossicles (3 small bones) of the middle ear and the oval window of the inner ear through the cochlea, the small hair-like nerve cells will be set in motion. Each hair cell has a natural sensitivity to a particular frequency of vibration. When the frequency of the compressional wave matches the natural frequency of the nerve cell, that hair cell will resonate with a larger amplitude of vibration. This increased vibrational amplitude induces the cell to release an electrical impulse that passes along the auditory nerve towards the brain. In a process that is not clearly understood, the brain is capable of interpreting the qualities of the sound upon reception of these electric nerve impulses. Thus, each of these hair cells is a separate channel of communication to the auditory nerve, ensuring robust hearing acuity when healthy.

In cases of hearing loss that can be remediated through a CI, many of these hair and nerve cells are damaged or dead, the greater the number, the greater the degree of hearing loss. Literally, the ear has lost many thousand channels of communication. CIs remediate hearing loss by implanting a series of electrodes (approximately 20 in multi-channel CIs) that stimulate the auditory nerve receptors, thus by-pass the damaged hair cells. Although CIs can replace a significant amount of dB hearing loss, they cannot match the aural acuity of the thousands of damaged hair cells. Thus, although a CI recipient's pure tone audiogram will likely be significantly improved, he or she is likely to continue to have significant speech discrimination difficulty. Various speech sounds will be ambiguous to the individual so that he or she will be unable to recognize the words spoken. Under these conditions, amplifying the sound processed by the CI will not achieve any additional significant improvement. It would simply be a louder unintelligible sound.

It is also important to understand that there is no definitive speech discrimination score that signifies an individual's ability to use the telephone system in a functionally equivalent manner. For example, an 80 percent speech discrimination score is likely sufficient for most casual telephone conversations with friends and acquaintances; however, it would be insufficient for many business or technical conversations. Thus, evaluation of a speech discrimination deficit must consider how it affects the ability of the individual to use the telephone system to carry on his life, in its various aspects, in a manner equivalent to a hearing person.

As is thus apparent, arriving at a definitive value for either hearing loss or speech discrimination as a threshold for use of CTS has its practical limitations. Nevertheless, the need exists for a reasonable proxy to simplify the certification process. Otherwise, the imposition on persons truly needing CTS would be substantial and serve to chill their use of a service they truly need. It is simply not reasonable to require all persons suffering a hearing loss to undergo a battery of speech discrimination tests to verify their need for captioned service. However, most persons with significant hearing loss would have undergone a pure tone audiogram A measure utilizing the average dB loss in the better ear is a convenient and cost effective proxy from which we can predict to a reasonable degree that a sufficient level of speech discrimination deficit will exist to justify use of CTS.

A hearing loss of greater than 40 dB in the better ear is defined as a moderate hearing loss. Some explanation is necessary to understand how significant a moderate hearing loss actually is. This level of hearing loss is defined as a disabling hearing impairment. It is roughly equivalent to the amount of hearing loss one would achieve by wearing **both** foam ear plugs and noise reduction ear phones. This level of hearing loss would indicate in the vast majority of individuals a significant number of damaged hair cells. At 40 dB of hearing loss, the amount of an average conversational speech signal missed can be as high as 60 percent or more. Even with hearing aids, one can "hear" but may miss much of what is said if the environment is noisy or reverberant. With personal hearing aids alone, the ability to fully perceive speech may be at risk due to the loss of aural acuity resulting from the damaged hair cells, even with hearing aids or other amplification. At 50 dB of hearing loss, the amount of speech signal missed can be 90 percent or more and amplification alone is unlikely to result in sufficient speech discrimination without the aid of visual cues.

Based on the above discussion, I recommend the use of the threshold standard for defining moderate hearing loss, greater than 40 dB hearing loss in the better ear, as the basic objective qualification standard to use CTS. That objective standard, however, must be supplemented with the alternative standard that qualifies the individual to use CTS if, in the reasonable opinion of a hearing professional, the individual is not capable of using the telephone system in a functionally equivalent manner with the aid of amplification due to his or her lack of adequate speech discrimination. Is it possible that the objective threshold could be set slightly higher, perhaps at 43 or 45 dB? Of course, any threshold standard will be arbitrary to some degree; however, raising the threshold about greater than 40 dB in my view will place a significant burden on the affected individuals in terms of requiring lengthy professional visits and expensive testing without significant corresponding benefit in terms of weeding out individuals who do not need CTS service.

The above statement is true and correct to the best of my knowledge, information and belief.

Ingrid McBride

Ingrid McBride, AuD., CCC-A

Dated: January 2, 2013